

## TITLE OF THE INVENTION

## COMMUNICATION METHOD AND APPARATUS

## FIELD OF THE INVENTION

5 The present invention relates to information setting processing for wireless LAN communication or the like.

## BACKGROUND OF THE INVENTION

10 Fig. 4 is a flowchart showing the outline of a conventional operation by a computer relating to a wireless LAN compliant with the IEEE 802.11 standard.

First, SSID (Service Set ID) and WEP (Wireless Equivalent Privacy) key necessary for establishment of 15 wireless LAN communication are previously inputted (step S401), and the input information is stored as a setting file on a hard disk (step S402).

Thereafter, when an OS on the computer detects a wireless LAN card (YES at step S403), a wireless LAN 20 driver software is started (step S404). The driver software reads the setting file on the hard disk (step S405), establishes wireless LAN communication based on the contents of the setting file (step S406), and establishes a network (step S407).

25 When the wireless LAN card is removed (YES at step S408), and when the card is connected to the computer again (YES at step S403), the operation except

step S404 is repeated.

In this manner, in a case where a computer or the like is arranged so as to serve a communication function of wireless LAN or the like, it is necessary 5 to previously set parameters necessary for communication. The parameter setting can be easily made by using a keyboard.

In recent years, it is also possible to obtain the necessary parameters via a network and 10 automatically perform setting based on the obtained parameters.

Japanese Patent Application Laid-Open (KOKAI) No. 2001-325166 (US 2002/174254) discloses a method for obtaining information necessary for network connection. 15 More particularly, in a case where a wireless communication apparatus is connected to a computer which lacks a DHCP (Dynamic Host Configuration Protocol) function, the wireless communication apparatus automatically obtains a network number. 20 Even in a case where the wireless communication apparatus compliant with the IEEE 802.11 standard is connected to a printer or the like, basically a wireless LAN can be realized as long as parameters necessary for communication are set within the 25 apparatus.

However, as input means of the printer or the like is generally limited, an operation for parameter

setting is very complicated.

In the above conventional art, the apparatus connected to the wireless communication apparatus is not a printer or the like. Further, there is no 5 disclosure about setting the necessary information in the printer or the like for wireless LAN communication as defined in the IEEE 802.11 standard or the like.

Since the possibility of eavesdropping and unauthorized access is increasing in recent years, it 10 is highly recommended to frequently change the setting of wireless communication function. Accordingly, it is very significant to facilitate setting of communication function in an apparatus with limited input means such as a printer.

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#### SUMMARY OF THE INVENTION

The present invention has its object to facilitate setting of communication function even in an apparatus with limited input means.

20 According to one aspect of the present invention, the foregoing object is preferably attained by providing a communication method for connecting a communication apparatus to a first apparatus and performing communication, comprising: a registration 25 step of connecting the communication apparatus to a second apparatus, and registering setting information for the first apparatus in the communication apparatus

via the second apparatus; and an establishment step of connecting the communication apparatus where the setting information has been registered at the registration step to the first apparatus, and

5 performing communication based on the setting information.

According to another aspect of the present invention, the foregoing object is preferably attained by providing a communication apparatus which performs

10 communication with outside by being connected with a first apparatus, comprising: a memory for storing setting information for the first apparatus transmitted from a second apparatus; and a communication unit to establish communication based on the setting

15 information stored in the memory under the control of the first apparatus.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying

20 drawings, in which like reference characters designate the same name or similar parts throughout the figures thereof.

#### BRIEF DESCRIPTION OF THE DRAWINGS

25 The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention and, together

with the description, serve to explain the principles of the invention.

Fig. 1 is a block diagram showing the construction of a wireless LAN card according to a 5 first embodiment of the present invention;

Fig. 2 is an explanatory view of memory space in an apparatus to which the wireless LAN card according to the first embodiment is connected;

Fig. 3 is a flowchart showing a method for 10 realizing a wireless LAN function in a printer by using the wireless LAN card according to the first embodiment;

Fig. 4 is a flowchart showing the outline of the conventional operation by the computer relating to the 15 wireless LAN compliant with the IEEE 802.11 standard; and

Fig. 5 is a flowchart showing a method for 20 realizing a wireless LAN function in a printer by using the wireless LAN card according to a second embodiment of the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will now be described in detail in accordance with the 25 accompanying drawings.

<First Embodiment>

In the present embodiment, a wireless LAN defined in the IEEE 802.11 standard will be described as a typical example. Accordingly, in the following description, the expression "wireless LAN" means a 5 wireless LAN compliant with the IEEE 802.11 standard. However, the present invention is not limited to this standard.

Fig. 1 is a block diagram showing a wireless LAN card as a wireless communication apparatus according to 10 the present embodiment, a personal computer as a setting apparatus, and an apparatus (printer) which can perform wireless LAN communication when connected to the wireless LAN card.

A wireless LAN card 1 is a PCMCIA PC card or the 15 like having an antenna 2 for wireless communication, a wireless LAN unit 11 as wireless communication means, a nonvolatile flash memory 12 capable of holding information necessary for wireless-LAN connection without power supply, and a card I/F 13 as an interface 20 (I/F) for an external apparatus.

As the external apparatus which must be provided with a PC card slot, a personal computer may be used, and further, an electronic apparatus such as a printer with limited input means, which requires very 25 troublesome operation for setting a communication function, may be used.

The external apparatus (personal computer 3,

printer 4) connected via the card I/F 13 can refer to the wireless LAN unit 11 and the contents of the flash memory 12 in the wireless communication apparatus 1.

The personal computer (PC) 3 is connected with 5 the wireless LAN card 1 via a card I/F 31, and stores various parameters for wireless LAN communication, inputted by a user's operation from an input unit 34 such as a keyboard, into the flash memory 12 of the wireless LAN card 1. A CPU 32 controls the overall 10 personal computer 3 based on a control program stored in a memory 33.

The printer 4 is connected to the wireless LAN card 1 via a card I/F 41, and realizes wireless LAN communication. A printing unit 44 performs printing 15 based on print data received via the wireless LAN card 1 under the control of a CPU 42. The CPU 42 controls the overall printer 4 based on a control program stored in a memory 43.

Fig. 3 is a flowchart showing a method for 20 realizing a wireless LAN function by e.g. the printer 4 by using the wireless LAN card 1.

First, the wireless LAN card 1 is connected to an apparatus such as a personal computer (PC) 3 on which setting can be easily made (step S301).

25 When the wireless LAN card 1 is connected to the PC via the card I/Fs 13 and 31, the wireless LAN card 1 is allocated to memory space as shown in Fig. 2 in the

PC. Hereinbelow, the PC is used as a setting apparatus.

Next, all the parameters necessary for establishment of wireless LAN communication such as SSID and WEP key used in an apparatus (printer) to be 5 actually used in wireless LAN communication are inputted from an operation unit 34 such as a keyboard of the PC (step S302), and the input parameters are written into the flash memory 12 of the wireless LAN card 1 (step S303).

10 When the writing has been completed, the wireless LAN card 1 is removed from the PC 3 connected with the LAN card for setting (step S304), and the wireless LAN card 1 is connected to the apparatus (printer 4) to be actually used in wireless LAN communication. As the 15 flash memory 12 is comprised of a nonvolatile memory, the contents are not lost even when it is removed from the PC.

When the wireless LAN card 1 is connected to the apparatus (printer 4) to be actually used in wireless 20 LAN communication via the card I/Fs 13 and 41, the CPU 42 of the printer 4 recognizes the wireless LAN card 1 (YES at step S311), reads driver software to control a wireless communication function of the printer itself from the memory 43 and starts the driver software (step 25 S312).

On the printer 4 side, the wireless LAN card 1 is allocated to memory space as shown in Fig. 2 as in the

case of the setting computer. However, the particular address of the wireless LAN card in the printer 4 may be different from that in the setting computer 3.

The driver software to control wireless

5 communication reads the parameters necessary for establishment of wireless LAN communication such as SSID and WEP key from the flash memory 12 of the wireless LAN card 1, and sets them in the wireless LAN unit 11 of the wireless LAN card 1 (step S313). The

10 wireless LAN unit 11 establishes wireless LAN communication using the set wireless LAN parameters (step S314), then establishes a network by a higher-layer protocol (step S315).

When it is necessary to change the setting of the

15 wireless LAN, the wireless LAN card 1 is removed from the apparatus (YES at step S316), and again connected to the PC 3 where setting can be easily made (step S301). On the PC 3, necessary parameter(s) for setting change is inputted (step S302) and stored in the flash

20 memory 12 (step S303).

Thereafter, the wireless LAN card 1 is removed from the setting apparatus (PC 3) (step S304), and connected to the apparatus (printer 4) actually used in the wireless LAN communication. The CPU 42 of the

25 printer 4 recognizes the wireless LAN card 1 (step S311), reads the driver software to control the wireless communication function of the printer itself

from the memory 43 and starts the driver software (step S312).

The driver software to control wireless communication reads the parameters necessary for 5 establishment of wireless LAN communication such as SSID and WEP key from the flash memory 12 of the wireless LAN card 1, and sets them in the wireless LAN unit 11 of the wireless LAN card 1 (step S313).

The wireless LAN unit 11 establishes wireless LAN 10 communication using the set wireless LAN parameters (step S314), then establishes a network by a higher-layer protocol (step S315).

As described above, parameters necessary for establishment of wireless LAN can be easily set, and 15 easily changed and used in establishment of wireless LAN communication.

#### [Second Embodiment]

In the present embodiment, upon registration of 20 the parameters such SSID and WEP key by the setting apparatus, an ID as identification information of the apparatus (printer), to be connected with the wireless LAN card 1 and to perform wireless communication, is also registered on the wireless LAN card 1, such that 25 the set parameters can be used only on the apparatus of the registered ID.

Fig. 5 is a flowchart showing a method for

realizing a wireless LAN function in e.g. the printer 4 using the wireless LAN card 1 according to the present embodiment of the present invention.

First, the wireless LAN card 1 is connected to an 5 apparatus such as a personal computer (PC) 3 on which setting can be easily made (step S301) via the card I/Fs 13 and 31.

When the wireless LAN card 1 is connected to the PC, the wireless LAN card 1 is allocated to memory 10 space as shown in Fig. 2 in the PC. Hereinbelow, the PC is used as a setting apparatus.

Next, the parameters necessary for establishment of wireless LAN communication such as SSID and WEP key used in an apparatus (printer 4) to be actually used in 15 wireless LAN communication and identification information (ID) of the apparatus (printer 4) to use the wireless LAN card 1 are inputted by using the operation unit 34 such as a keyboard of the PC 3 (step S501), and the input parameters and information are 20 written into the flash memory 12 of the wireless LAN card 1 (step S502).

When the writing has been completed, the wireless LAN card 1 is removed from the PC 3 connected with the LAN card for setting (step S304), and the wireless LAN 25 card 1 is connected to the apparatus (printer 4) to be actually used in wireless LAN communication via the card I/Fs 13 and 41. As the flash memory 12 is

comprised of a nonvolatile memory, the contents are not lost even when it is removed from the PC.

When the wireless LAN card 1 is connected to the apparatus (printer 4) to be actually used in wireless LAN communication, the CPU 42 of the printer 4 recognizes the wireless LAN card 1 (YES at step S311), reads driver software to control a wireless communication function of the printer itself from the memory 43 and starts the driver software (step S312).

10 On the printer 4 side, the wireless LAN card 1 is allocated to memory space as shown in Fig. 2 as in the case of the setting computer. However, the particular address of the wireless LAN card in the printer 4 may be different from that in the setting computer 3.

15 The driver software to control wireless communication reads the identification information of the printer from the flash memory 12 of the wireless LAN card 1 and compares it with identification information set in the apparatus itself (step S512).

20 As a result, if the read identification information and the identification information previously-set in the apparatus itself are different, an error message is displayed on a display unit. Then the process returns to step S311.

25 If the read identification information and the previously-set identification information correspond with each other, the driver software reads the

parameters necessary for establishment of wireless LAN communication such as SSID and WEP key from the flash memory 12 of the wireless LAN card 1, and sets them in the wireless LAN unit 11 of the wireless LAN card 1

5 (step S313). The wireless LAN unit 11 establishes wireless LAN communication using the set wireless LAN parameters (step S314), then establishes a network by a higher-layer protocol (step S315).

As in the case of the first embodiment, when it

10 is necessary to change the setting of the wireless LAN, the wireless LAN card 1 is removed from the apparatus (YES at step S316), and again connected to the PC 3 where setting can be easily made.

Note that as the setting on the setting apparatus,

15 parameters for plural apparatuses can be set. In this case, parameters are set for each identification information of plural apparatuses at step S501, and these settings are stored at step S502.

At step S512, it is determined whether or not the

20 plural identification information stored on the wireless LAN card 1 include identification information of the apparatus itself (printer 4). If the identification information of the apparatus itself is included, the parameters corresponding to the

25 identification information are read and then set (step S313). In this manner, as apparatus settings for each of environments of use are previously set by using the

setting apparatus, when the wireless LAN card 1 is brought into one environment and connected to an apparatus used in the environment, parameters corresponding to the environment and the apparatus can 5 be automatically read and utilized.

The present invention is not limited to the above embodiments and various changes and modifications can be made within the spirit and scope of the present invention. Therefore, to appraise the public of the 10 scope of the present invention, the following claims are made.